State/Industry Network

Air Quality Report

4th Quarter 1998

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Air Quality Monitoring Branch
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North Dakota Department of Health

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SECTION ONE

DISCUSSION OF

MONITORING RESULTS

Sulfur Dioxide (SO_2)

There were no exceedances of either the State or Federal standards during the quarter. The maximum 1-hour concentration was 163 ppb on October 9 at Beulah; the maximum 3-hour concentration was 134 ppb on October 9 at Beulah; and, the maximum 24-hour concentration was 43 ppb on October 6 at Mandan Refinery - SPM. All sites achieved at least an 80% data recovery for the period operated except Amerada Hess - Tioga #1.

Amerada Hess - Tioga #1 failed to achieve 80% data recovery due to the in-line filter replaced with the paper separator.

Sulfur Dioxide (SO_2) 5-Minute Average

The maximum 5-minute concentration was 241 ppb on October 9 at Beulah.

Hydrogen Sulfide (H_2S)

There were no exceedances of the H_2S standards during the quarter. The maximum 1-hour concentration was 31 ppb on October 15 at Amerada Hess - Tioga #2; the maximum 24-hour concentration was 5 ppb on December 19 at Amerada Hess - Tioga #2; the maximum 3-month concentration was 2 ppb in October at Amerada Hess - Tioga #2. The site achieved at least an 80% data recovery for the period operated.

Ozone (O_3)

There was no exceedance of the ozone standard during the quarter. The maximum observed 1-hour concentration was 51 ppb on October 9 at Hannover. The maximum 8-hour concentration was 49 ppb on October 9 at Hannover. All sites achieved at least an 80% data recovery for the period operated except Beulah.

Beulah failed to achieve 80% data recovery due to an analyzer malfunction.

Ozone was added to Dunn Center effective December 14. This data will be used as background data for the Western half of the State.

Nitrogen Dioxide (NO_2)

The maximum 1-hour concentration observed was 65 ppb on October 27 at DGC #12. All sites achieved at least an 80% data recovery for the period operated.

Nitrogen dioxide was added to Dunn Center effective December 14. This data will be used as background data for the Western half of the State.

Inhalable FRM $PM_{2.5}$ Particulates

The maximum 24-hour average concentration was 10.0 $\mu g/m^3$ on December 13 at Sharon. All sites achieved at least an 80% data recovery for the period operated except Grand Forks, Fargo, Bismarck, and Short Creek.

The FRM $PM_{2.5}$ network was officially started on December 13. However, in sampler test runs prior to the official startup, mechanical problems were identified with the samplers in Grand Forks, Fargo, and Bismarck. The samplers at Grand Forks, Fargo, and Bismarck did not achieve 80% due to problems with the filter exchange mechanism. The manufacturer was contacted and we were added to the list of cold-weather states to receive modified filter exchange mechanisms and filter magazines. Short Creek did not achieve 80% do to a problem with using nylon filters for measuring mass.

Inhalable non-FRM $PM_{2.5}$ Particulates

The maximum 24-hour average concentration was 19.4 $\mu g/m^3$ on November 25 at Bismarck Residential. All sites achieved at least an 80% data recovery for the period operated.

The Beulah sampler was terminated December 13, and removed.

Inhalable PM_{10} Particulates

There was no exceedance of the 24-hour standard during the quarter. The maximum 24-hour average concentration was 55.3 $\mu g/m^3$ on October 2 at Grand Forks - North. All sites achieved at least an 80% data recovery for the period operated.

The samplers at Beulah, Bismarck Residential, Dickinson, Grand Forks - North, and Sharon were terminated effective December 31. This is in response to establishing the $PM_{2.5}$ FRM network.

Inhalable $PM_{2.5}$ Sulfates (SO_4)

The purpose for sulfate analysis is to aid the Department in assessing the impact of SO_2 emissions on inhalable particulate concentrations and visibility. The maximum 24-hour $PM_{2.5}$ sulfate concentration was 4.0 $\mu g/m^3$ on November 19 at Bismarck Residential.

Inhalable PM_{10} Sulfates (SO_4)

The purpose for sulfate analysis is to aid the Department in assessing the impact of SO_2 emissions on inhalable particulate concentrations and visibility. The maximum 24-hour PM_{10} sulfate concentration was 4.7 $\mu g/m^3$ on November 19 at Bismarck Residential. All sites achieved at least an 80% data recovery for the period operated.

$PM_{2.5}$ Sulfate /$PM_{2.5}$ Analysis

The $PM_{2.5}$ sulfate/$PM_{2.5}$ total mass tables present statistics for $PM_{2.5}$ sulfate and $PM_{2.5}$ total mass when both concentrations are greater than the respective minimum detectable concentration: 0.5 µg/m^3 for $PM_{2.5}$ sulfate analysis; 4 µg/m^3 for $PM_{2.5}$ total mass. Statistics for the ratio are produced by evaluating the ratio of the $PM_{2.5}$ sulfate concentration to the $PM_{2.5}$ total mass concentration for each data pair. In the individual summaries, one-half of the minimum detectable concentration is substituted for those concentrations less than the minimum detectable value. However, when the $PM_{2.5}$ total mass concentration is less than 4 µg/m^3, the $PM_{2.5}$ sulfate concentration can be higher than the $PM_{2.5}$ total mass concentration. This is because of the variability in the sulfate analysis procedure at low concentrations. Therefore, when calculating the ratio of $PM_{2.5}$ sulfate concentration to $PM_{2.5}$ total mass concentration, only data pairs where both the $PM_{2.5}$ sulfate and $PM_{2.5}$ total mass concentrations are greater than the minimum detectable concentrations are used. When the ratio is multiplied by 100, it becomes the percentage of total mass which is sulfate. The maximum $PM_{2.5}$ Sulfate/$PM_{2.5}$ total mass ratio was 0.333 (33.3%) on December 31 at Bismarck Residential. The maximum average ratio was 0.155 (15.5%) at Beulah.

PM_{10} Sulfate/PM_{10} Analysis

The PM_{10} sulfate/PM_{10} total mass tables present statistics for PM_{10} sulfate and PM_{10} total mass when both concentrations are greater than the respective minimum detectable concentration: 0.5 µg/m^3 for PM_{10} sulfate analysis; 4 µg/m^3 for PM_{10} total mass. Statistics for the ratio are produced by evaluating the ratio of the PM_{10} sulfate concentration to the PM_{10} total mass concentration for each data pair. In the individual summaries, one-half of the minimum detectable concentration is substituted for those concentrations less than the minimum detectable value. However, when the PM_{10} total mass concentration is less than 4 µg/m^3, the PM_{10} sulfate concentration can be higher than the PM_{10} total mass concentration. This is because of the variability in the sulfate analysis procedure at low concentrations. Therefore, when calculating the ratio of PM_{10} sulfate concentration to PM_{10} total mass concentration, only data pairs where both the PM_{10} sulfate and PM_{10} total mass concentrations are greater than the minimum detectable concentrations are used. When the ratio is multiplied by 100, it becomes the percentage of total mass which is sulfate. The maximum PM_{10} Sulfate/PM_{10} total mass ratio was 0.383 (38.3%) on November 19 at Dickinson Residential. The maximum average ratio was 0.151 (15.1%) at Sharon.

SECTION TWO

AMBIENT AIR QUALITY DATA

SUMMARIES

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Sulfur Dioxide (ppb)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MAXIMA 1-HOUR 1ST MM/DD/HH	MAXIMA 1-HOUR 2ND MM/DD/HH	MAXIMA 3-HOUR 1ST MM/DD/HH	MAXIMA 3-HOUR 2ND MM/DD/HH	24-HOUR 1ST MM/DD	24-HOUR 2ND MM/DD	ARITH MEAN	1HR #>273	24HR #>99	% >MDV
Amerada Hess - Tioga #1	1998	OCT-DEC	1533 ***	26 12/19/16	25 11/26/12	20 12/19/14	16 12/19/17	7 12/19	4 12/30	1.6			13.4
Amerada Hess - Tioga #3	1998	OCT-DEC	2190	49 11/14/06	47 10/06/12	39 10/06/14	37 11/14/08	16 10/06	12 12/19	2.2			17.3
Bear Paw - MGP #3	1998	OCT-DEC	1827	13 11/06/20	12 12/30/15	10 12/30/17	9 11/06/20	4 12/30	3 12/31	1.2			8.5
Bear Paw - MGP #5	1998	OCT-DEC	1848	20 11/01/19	20 11/01/20	16 11/01/23	15 11/01/20	6 11/01	5 12/30	1.4			11.2
Beulah	1998	OCT-DEC	2196	163 10/09/13	128 10/09/12	134 10/09/14	55 10/09/11	25 10/09	8 12/31	2.5			36.7
DGC #12	1998	OCT-DEC	2181	61 10/25/18	49 10/22/10	35 10/25/20	32 11/06/11	13 11/06	8 10/25	3.6			79.0
DGC #14	1998	OCT-DEC	2197	69 12/08/11	58 11/23/12	47 10/23/11	37 12/08/11	15 12/07	10 10/23	2.4			23.8
DGC #16	1998	OCT-DEC	2188	46 10/25/19	38 10/01/08	28 11/03/17	24 10/01/11	13 11/03	12 10/01	4.6			87.9
DGC #17	1998	OCT-DEC	2163	72 10/27/14	41 11/04/09	32 10/02/05	26 11/03/17	12 11/03	11 10/02	4.5			71.5
Dunn Center	1998	OCT-DEC	2188	19 11/04/13	18 10/27/14	13 11/04/14	11 10/27/14	5 12/30	5 12/31	1.4			14.6
Fargo NW	1998	OCT-DEC	2191	8 12/29/05	5 12/25/08	4 12/28/08	4 12/30/08	2 11/20	2 12/30	1.1			7.0
Hannover	1998	OCT-DEC	2190	61 10/25/18	44 10/28/08	35 10/25/20	28 10/25/17	14 10/13	13 10/25	2.3			26.3
Mandan Refinery - SPM	1998	OCT-DEC	2196	120 11/10/14	115 12/17/22	99 10/06/05	83 12/17/23	43 10/06	28 11/10	4.4			30.1
Mandan Refinery NW - SPM	1998	OCT-DEC	2194	113 11/24/05	87 10/03/07	62 11/24/08	61 10/03/08	29 10/03	15 11/24	3.2			39.1

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : SULFUR DIOXIDE (ppb)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MAXIMA 1 - HOUR 1ST MM/DD/HH	MAXIMA 1 - HOUR 2ND MM/DD/HH	MAXIMA 3 - HOUR 1ST MM/DD/HH	MAXIMA 3 - HOUR 2ND MM/DD/HH	24 - HOUR 1ST MM/DD	24 - HOUR 2ND MM/DD	ARITH MEAN	1HR #>273	24HR #>99	% >MDV
Sharon	1998	OCT-DEC	2196	5 12/22/05	4 12/07/17	3 12/07/17	3 12/26/11	2 12/07	1 12/31	1.0			2.1
TRNP - SU (Painted Canyon)	1998	OCT-DEC	2192	12 12/31/22	11 12/30/18	10 12/30/20	10 12/31/23	4 12/30	3 12/31	1.2			7.4
White Shield	1998	OCT-DEC	2197	53 10/07/21	29 10/13/12	24 10/07/23	19 10/13/17	8 10/13	6 11/03	1.8			16.2

The maximum 1-hour concentration is 163 ppb at Beulah on 10/09/13
The maximum 3-hour concentration is 134 ppb at Beulah on 10/09/14
The maximum 24-hour concentration is 43 ppb at Mandan Refinery - SPM on 10/06

* The air quality standards are:
STATE Standards -
1) 273 ppb maximum 1-hour average concentration.
2) 99 ppb maximum 24-hour average concentration.
3) 23 ppb maximum annual arithmetic mean concentration.

FEDERAL Standards -
1) 500 ppb maximum 3-hour concentration not to be exceeded more than once per year.
2) 140 ppb maximum 24-hour concentration not to be exceeded more than once per year.
3) 30 ppb annual arithmetic mean.

*** Less than 80% of the possible samples (data) were collected.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Sulfur Dioxide 5-Minute Averages (ppb)

LOCATION	YEAR	PERIOD	OBS	5 - M I N U T E M A X I M A 1ST	DATE MM/DD/HH	2ND	DATE MM/DD/HH	3RD	DATE MM/DD/HH	# HOURS >600	% >MDV
Bear Paw - MGP #3	1998	OCT-DEC	1827	40	10/29/03	35	10/29/04	25	11/10/09	0	15.3
Bear Paw - MGP #5	1998	OCT-DEC	1848	90	11/15/10	51	11/15/19	40	11/01/20	0	22.1
Beulah	1998	OCT-DEC	2196	241	10/09/10	228	10/09/13	221	10/09/11	0	51.6
Dunn Center	1998	OCT-DEC	2188	34	10/10/07	31	11/10/14	29	11/04/13	0	20.9
Fargo NW	1998	OCT-DEC	2191	8	12/29/05	5	12/29/08	5	12/28/05	0	7.0
Hannover	1998	OCT-DEC	2190	93	10/28/08	88	10/28/09	87	10/25/18	0	36.7
Mandan Refinery - SPM	1998	OCT-DEC	2196	204	12/17/22	189	11/17/16	188	12/18/08	0	42.9
Mandan Refinery NW - SPM	1998	OCT-DEC	2194	197	10/01/09	194	11/01/05	146	12/29/23	0	53.6
Sharon	1998	OCT-DEC	2196	5	12/22/05	4	12/22/17	3	12/07/15	0	2.1
TRNP - SU (Painted Canyon)	1998	OCT-DEC	2192	12	12/31/22	11	12/31/18	11	12/30/19	0	7.4

The maximum 5-minute concentration is 241 ppb at Beulah on 10/09/10

* No Standard is currently in effect:

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Hydrogen Sulfide (ppb)

				M A X I M A								
				1 - HOUR		24 - HOUR		3 - MONTH				
LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	1ST MM/DD/HH	2ND MM/DD/HH	1ST MM/DD	2ND MM/DD	1ST MM	2ND MM	ARITH MEAN	1HR #>200	24HR #>100	% >MDV
Amerada Hess - Tioga #2	1998	OCT-DEC	1848	31 10/15/09	29 10/14/20	5 12/19	4 12/28	2 10	2 11	1.5			11.0

The maximum 1-hour concentration is 31 ppb at Amerada Hess - Tioga #2 on 10/15/09
the maximum 24-hour concentration is 5 ppb at Amerada Hess - Tioga #2 on 12/19
The maximum 3-month concentration is 2 ppb at Amerada Hess - Tioga #2 on 10

* The State air quality standards are:
1) 10 ppm maximum instantaneous (ceiling) concentration not to be exceeded.
2) 200 ppb maximum 1-hour average concentration not to be exceeded more than once per month.
3) 100 ppb maximum 24-hour average concentration not to be exceeded more than once per year.
4) 20 ppb maximum arithmetic mean concentration averaged over three consecutive months.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Ozone (PPB)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MAXIMA 1-HOUR 1ST MM/DD/HH	1-HOUR 2ND MM/DD/HH	1-HOUR 3RD MM/DD/HH	MAXIMA 8-HOUR 1ST MM/DD/HH	8-HOUR 2ND MM/DD/HH	8-HOUR 3RD MM/DD/HH	1HR #>120	8HR #>80
Beulah	1998	OCT-DEC	1444 ***	46 10/22/13	45 10/22/12	45 10/09/15	41 10/28/09	37 10/22/09	37 10/28/10		
Dunn Center	1998	DEC-DEC	412	40 12/18/17	39 12/18/15	39 12/18/16	38 12/18/15	36 12/18/14	36 12/18/13		
Fargo NW	1998	OCT-DEC	2190	43 10/23/15	42 10/22/14	42 10/22/15	37 12/18/94	37 12/18/93	37 12/18/92		
Hannover	1998	OCT-DEC	1835	51 10/09/14	50 10/09/13	50 10/09/12	49 10/09/11	41 10/09/12	41 10/09/10		
Sharon	1998	OCT-DEC	2196	47 10/09/15	45 10/09/14	43 10/08/15	42 11/22/14	40 11/22/13	40 11/22/92		
TRNP - SU (Painted Canyon)	1998	OCT-DEC	2192	49 10/26/15	48 10/09/12	48 10/24/17	46 10/09/11	42 10/09/10	42 10/09/09		

The maximum 1-hour concentration is 51 ppb at Hannover on 10/09/14
The maximum 8-hour concentration is 49 ppb at Hannover on 10/09/11

* The air quality standards for ozone are:
STATE - 120 ppb not to be exceeded more than once per year.

FEDERAL Standards -
1) 120 ppb maximum 1-hour concentration with no more than one expected exceedance per year.
2) Fourth highest daily maximum 8-hour averages for a 3-year period not to exceed 80 ppb.

*** Less than 80% of the possible samples (data) were collected.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Nitrogen Dioxide (ppb)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MAXIMA 1-HOUR 1ST MM/DD/HH	MAXIMA 1-HOUR 2ND MM/DD/HH	ARITH MEAN	% >MDV
Beulah	1998	OCT-DEC	2194	37 10/09/18	36 10/09/19	4.2	76.5
DGC #12	1998	OCT-DEC	2173	65 10/27/13	52 11/14/01	4.8	100.0
DGC #17	1998	OCT-DEC	2144	47 11/03/10	38 10/02/04	3.9	89.6
Dunn Center	1998	DEC-DEC	408	6 12/30/07	5 12/28/04	1.3	19.1
Fargo NW	1998	OCT-DEC	2187	44 11/20/09	38 10/09/17	7.3	83.3
Hannover	1998	OCT-DEC	2185	31 12/29/18	25 10/07/18	2.4	55.2
Sharon	1998	OCT-DEC	2195	16 12/02/21	10 10/03/07	1.8	41.5

The maximum 1-hour concentration is 65 ppb at DGC #12 on 10/27/13

* The air quality standards are:
STATE - 53 ppb maximum annual arithmetic mean.

FEDERAL - 53 ppb annual arithmetic mean.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Inhalable FRM $PM_{2.5}$ Particulates ($\mu g/m^3$)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAXIMA 24-HOUR 1ST MM/DD	2ND MM/DD	3RD MM/DD	ARITH MEAN	#> 65	AM>15	% >MDV
Beulah - North	1998	DEC-DEC	4	2.3	6.6 12/31	6.5 12/25	3.7 12/19	4.8			100.0
Sharon	1998	DEC-DEC	4	0.1	10.0 12/13	5.3 12/19	4.9 12/25	5.3			75.0

The maximum 24-hour concentration is 10.0 $\mu g/m^3$ at Sharon on 12/13

* The ambient air quality standards are:
FEDERAL Standards -
1) 24-hour: 3-year average of 98th percentiles not to exceed 65 $\mu g/m3$.
2) Annual: 3-year average not to exceed 15$\mu g/m3$.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Inhalable non-FRM $PM_{2.5}$ Particulates ($\mu g/m^3$)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAXIMA 24-HOUR 1ST MM/DD	2ND MM/DD	3RD MM/DD	ARITH MEAN	#> 50	AM>20	% >MDV
Beulah	1998	OCT-DEC	13	3.0	13.0 10/26	9.6 11/07	9.4 10/08	6.9			76.9
Bismarck Residential	1998	OCT-DEC	16	3.3	19.4 11/25	16.6 12/01	16.1 11/19	11.0			93.7

The maximum 24-hour concentration is 19.4 $\mu g/m^3$ at Bismarck Residential on 11/25

* The ambient air quality standards are:
FEDERAL Standards -
1) 24-hour: 3-year average of 98th percentiles not to exceed 65 $\mu g/m^3$.
2) Annual: 3-year average not to exceed 15$\mu g/m^3$.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Inhalable PM_{10} Particulates ($\mu g/m^3$)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAXIMA 24-HOUR 1ST MM/DD	2ND MM/DD	3RD MM/DD	ARITH MEAN	#>150	AM>50	% >MDV
Beulah	1998	OCT-DEC	16	3.6	12.8 10/26	12.5 12/01	11.7 12/31	8.1			93.7
Bismarck Residential	1998	OCT-DEC	16	4.8	29.9 11/25	26.2 12/01	19.4 10/14	14.3			100.0
Dickinson Residential	1998	OCT-DEC	16	2.2	17.7 10/08	15.8 12/01	13.8 10/26	8.1			87.5
Dragswolf	1998	OCT-DEC	16	2.0	11.0 10/02	8.0 10/26	7.0 11/07	4.9			75.0
Fargo NW	1998	OCT-DEC	15	3.2	22.2 10/26	21.9 11/07	18.6 10/20	11.2			93.3
Grand Forks - North	1998	OCT-DEC	16	9.5	55.3 10/02	42.7 10/20	29.5 10/08	21.4			100.0
Sharon	1998	OCT-DEC	16	2.6	30.8 10/02	14.5 11/07	13.2 10/15	8.6			75.0
Short Creek - SPM	1998	OCT-DEC	16	2.7	16.2 10/20	14.1 10/02	12.4 10/26	7.9			87.5
White Shield	1998	OCT-DEC	15	2.0	12.0 10/02	12.0 10/26	7.0 10/08	5.9			80.0

The maximum 24-hour concentration is 55.3 $\mu g/m^3$ at Grand Forks - North on 10/02

* The STATE and FEDERAL air quality standards are:
1) 150 $\mu g/m^3$ maximum averaged over a 24-hour period with no more than one expected exceedance per year.
2) 50 $\mu g/m^3$ expected annual arithmetic mean.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Inhalable $PM_{2.5}$ Sulfates ($\mu g/m^3$)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAXIMUM 24-HOUR 1ST MM/DD	MAXIMUM 24-HOUR 2ND MM/DD	MAXIMUM 24-HOUR 3RD MM/DD	ARITH MEAN	#>15.	AM>5.	% >MDV
Beulah	1998	OCT-DEC	13	0.3	2.6 10/26	2.3 11/19	1.3 11/07	1.1			92.3
Bismarck Residential	1998	OCT-DEC	16	0.3	4.0 11/19	3.6 12/31	1.9 10/26	1.2			93.7

The maximum 24-hour concentration is 4.0 µg/m3 at Bismarck Residential on 11/19

* No standard is currently in effect.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : Inhalable PM_{10} Sulfates ($\mu g/m^3$)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAXIMUM 24-HOUR 1ST MM/DD	MAXIMUM 24-HOUR 2ND MM/DD	MAXIMUM 24-HOUR 3RD MM/DD	ARITH MEAN	#>15.	AM>5.	% >MDV
Beulah	1998	OCT-DEC	16	0.2	2.8 10/26	2.3 11/19	2.2 12/31	1.1			81.2
Bismarck Residential	1998	OCT-DEC	16	0.4	4.7 11/19	3.9 12/31	2.1 10/26	1.4			93.7
Dickinson Residential	1998	OCT-DEC	16	0.4	3.0 12/31	2.0 10/26	1.8 11/19	1.0			87.5
Fargo NW	1998	OCT-DEC	15	0.4	3.0 10/26	1.7 12/31	1.4 10/14	1.0			86.6
Grand Forks - North	1998	OCT-DEC	16	0.4	2.4 10/26	2.1 12/31	1.5 10/08	1.0			87.5
Sharon	1998	OCT-DEC	16	0.5	2.2 11/13	2.0 10/15	1.8 10/26	1.1			100.0
Short Creek - SPM	1998	OCT-DEC	16	0.3	3.0 11/19	1.7 10/26	1.6 12/31	0.9			75.0

The maximum 24-hour concentration is 4.7 $\mu g/m^3$ at Bismarck Residential on 11/19

* No standard is currently in effect.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : $PM_{2.5}$ Sulfate/PM_{25} Total Mass Ratio (Percentage)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAX 1ST MM/DD	MAX 2ND MM/DD	MAX 3RD MM/DD	ARITH MEAN
Beulah	1998	OCT-DEC	9	8.1	28.0 11/19	20.0 10/26	16.7 12/01	15.5
Bismarck Residential	1998	OCT-DEC	14	3.0	33.3 12/31	24.8 11/19	15.6 12/25	11.8

The maximum 24-hour ratio is 33.3 percent at Bismarck Residential on 12/31

* No standard is currently in effect.

COMPARISON OF AIR QUALITY DATA WITH
THE NORTH DAKOTA AMBIENT AIR QUALITY STANDARDS *

POLLUTANT : PM_{10} Sulfate/PM_{10} Total Mass Ratio (Percentage)

LOCATION	YEAR	SAMPLING PERIOD	NUM OBS	MIN	MAX 1ST MM/DD	MAX 2ND MM/DD	MAX 3RD MM/DD	ARITH MEAN
Beulah	1998	OCT-DEC	12	8.8	21.9 10/26	20.7 11/19	19.4 12/19	14.7
Bismarck Residential	1998	OCT-DEC	15	2.3	26.3 11/19	26.0 12/31	13.9 10/26	11.2
Dickinson Residential	1998	OCT-DEC	13	3.8	38.3 11/19	36.1 12/31	18.8 11/07	14.8
Fargo NW	1998	OCT-DEC	12	4.8	19.0 12/19	16.2 12/31	13.5 10/26	9.7
Grand Forks - North	1998	OCT-DEC	14	1.1	13.1 12/31	10.9 10/26	8.3 11/01	6.3
Sharon	1998	OCT-DEC	12	1.6	32.4 11/13	30.0 10/26	19.2 12/31	15.1
Short Creek - SPM	1998	OCT-DEC	11	3.1	26.5 11/19	21.3 12/31	16.9 10/14	13.3

The maximum 24-hour ratio is 38.3 percent at Dickinson Residential on 11/19

* No standard is currently in effect.

SECTION THREE

EXCEEDANCE LISTINGS

By Site Date Hour

All Units Are in Parts Per Billion Except Wind Direction (Degrees),
Wind Speed (MPH), CO (PPM), and $PM_{2.5}$ and PM_{10} ($\mu g/m^3$)

The * Identifies the Exceedances

NONE

By Date Hour Site

All Units Are in Parts Per Billion Except Wind Direction (Degrees),
Wind Speed (MPH), CO (PPM), and $PM_{2.5}$ and PM_{10} ($\mu g/m^3$)

The * Identifies the Exceedances

NONE